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ABSTRACT

As one in a series of two teacher's guides dealing with environmental education, this publication for grades 7-12 contains basic concepts, activities, and questions designed to emphasize the primary role of man as a participant in, rather than master of, his natural surroundings. Topics covered include survival, interdependence, scarcity, recyclement, right vs. responsibility, planning, valuing, social forces, and optimism. For each concept or generalization, activities which the teacher might conduct are suggested accompanied by several probing questions. Activities are not intended to reflect a subject matter orientation. Three appendices provide useful information as to (1) a list of subject headings and topics pertinent to the environment; (2) periodical, general, and film indexes featuring environmental concerns; (3) individuals, groups, and government agencies that may serve as resources of information or as classroom speakers on the environmental issue. (BL)

K-12

Environmental Education Instructional Activities

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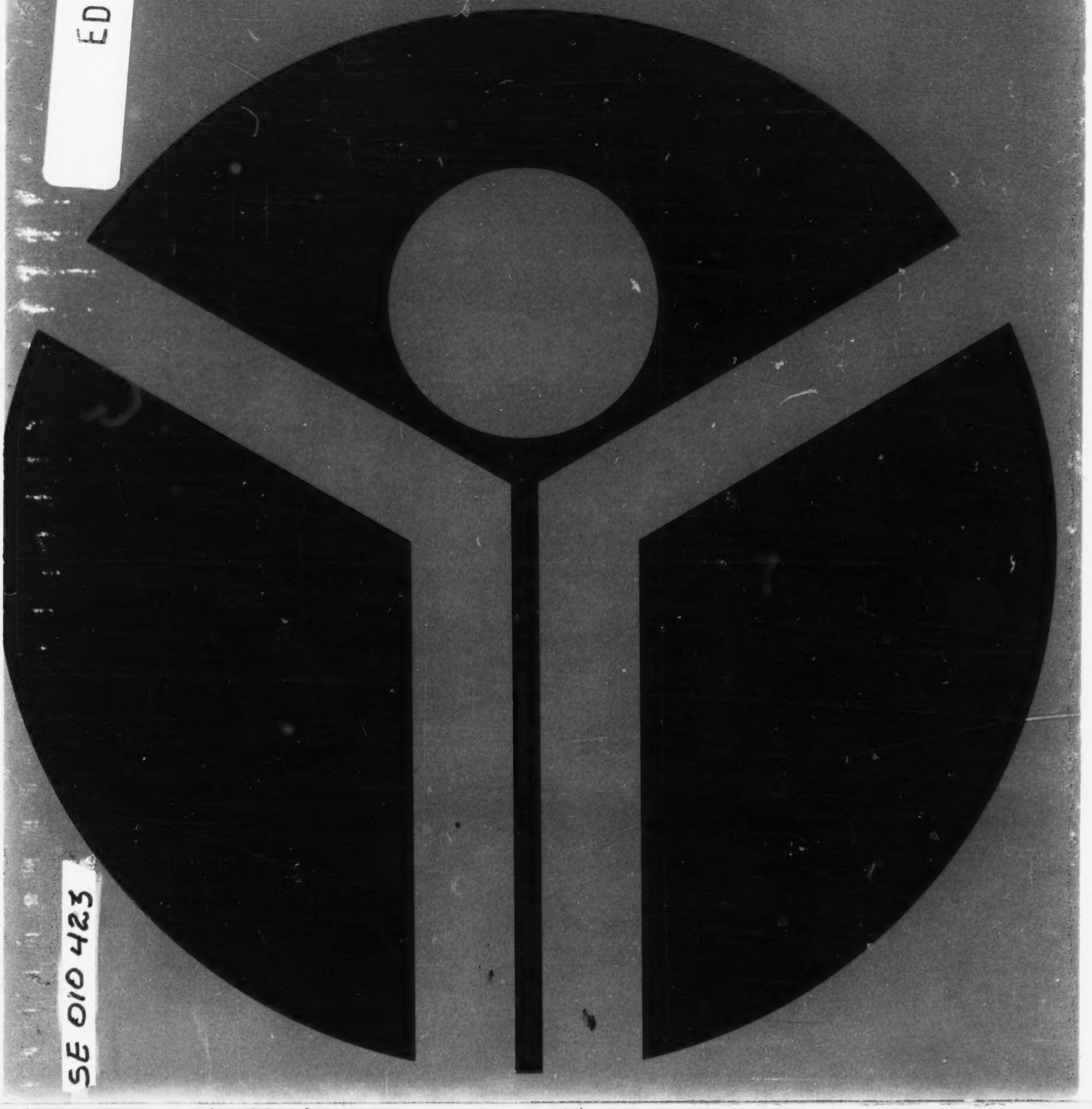

SE 010 423

7-12

Environmental Education Instructional Activities

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The University of the State of New York
The State Education Department
Albany, New York 12224
1970

Theme

Man: Steward*of his Environment

*__Steward__; one called to exercise responsible care over possessions entrusted to him (a steward of the time, talent, and treasure entrusted to his care).

Foreword

Ecological despoliation proceeds apace. Man threatens to destroy the biosphere. There is increasing awareness of the need to protect and restore the environment from the unforeseen consequences of our own activities. Yet, such awareness must be accelerated since at its present rate, it is unlikely to influence practical decisionmaking by government, industry, or the man on farm or street.

Technology and population continue to expand in alarming proportions with little concern for future implications. Under such circumstances, it is imperative that we develop knowledge and understandings which will allow us to create individual and collective harmony with our world. In short, we have reached the point where we must understand that every significant activity undertaken may have potential consequences that can affect the entire world.

In light of this, the State Education Department has accepted the responsibility for developing an awareness of and a responsibility to the environment. Environmental education should be an integral part of the school curriculum and extend from elementary school through continuing education. In the formative, elementary years, children can be exposed to a variety of experiences that will contribute to their understanding of the environment and an appreciation of its beauty and value. At the secondary level, students may become involved with community problems and those factors that affect the environment. Through continuing education, citizens can become better informed about current environmental problems and be motivated to solve such problems.

I commend these instructional materials to the schools in the trust that administrators, boards, and teachers share my deep concerns and the high priority I attach to environmental education.

Ewald B. Nyquist

EWALD B. NYQUIST
Commissioner of Education

Rationale

The fragile and finite nature of the environment, which is finally becoming real and urgent in terms of popular awareness, decrees a role for man which heretofore has not been clearly defined nor responsibly adhered to. As the most sophisticated participant in it, man must be the STEWARD of this environment.

More specifically stated, the understanding and greater knowledge of the INTERDEPENDENCE of living things with themselves and their environment should delineate man's PLAN for the well-being and SURVIVAL of himself and his environment. Recognition of certain absolutes of the physical world such as RECYCLEMENT and SCARCITY should make imperative the consideration of VALUES, choices, and alternatives which, for the most part, have not previously been significant factors in man's thinking.

Man has a RESPONSIBILITY toward his natural surroundings, and therefore to himself, if we accept the concept of interdependence. But to date, he has been ignorant of, or disinterested in, the consequences of his arbitrary manipulation of the environment. He has exercised his presumed RIGHT with little regard for the effect of these actions. Acceptance of his implicit responsibilities will permit man to marshal and direct the SOCIAL FORCES which will redress the current ecological imbalance and to OPTIMISTICALLY face a future of greater harmony with his environment.

Introduction

Not enough of us who worked on this publication, who read its contents, or who share our position in life, can act quickly or effectively enough to completely redress the imbalance which exists in man's relationship with his environment. We must take whatever measures are necessary to check our exploitation and wastefulness and, more importantly, we must inculcate in our children values and attitudes which are consistent with the preservation of the environment.

Thus, the effort which this publication represents was conceived as an initial and exploratory attempt to couch a small part of the school's curricular preoccupation in terms which emphasize the primary role of man as a participant in, rather than as master of, his natural surroundings.

There are basic concepts which underlie man's natural existence, some of which have been used in this publication to organize some suppositions about this existence. So stated, these suppositions have some serious implications for the manner in which we should live. The activities assigned to each of these suppositions or generalizations are presented in the hope that participation will enhance understanding. The questions which accompany each activity should serve as guides to the direction or objective implicit in the activity.

The activities are not intended to reflect a subject matter orientation, although some will obviously lend themselves more readily to one situation than to another. The object is that any teacher concerned about the environment will feel prompted to make use of these activities. If use of the publication in this manner suggests to a teacher that some overt, classroom attention to the problem is justified, one goal has been achieved. If the generalizations and activities influence a child to rethink an attitude, question a commonplace, or make a value judgment, then something more has been achieved.

Beyond the concepts, generalizations, and activities, the publication has three appendixes which provide useful information:

- Appendix A is a list of subject headings intended to facilitate use of a library's resources in augmenting teacher and student awareness of the environmental question. The list is detailed and it encompasses most topics pertinent to the environment.

- Appendix B furnishes a general list of indexes, names of periodicals which frequently highlight environmental concerns, a list of periodicals which treat the environment as a continuing feature, and a list of authors who write about the environment.

- Appendix C suggests the types of individuals who might be available for classroom visits as resource persons.

In addition to using the information described in the Appendixes, teachers should note that, to an increasing degree, public libraries are providing booklists, speakers, films, and displays which deal directly with environmental issues.

This publication is, hopefully, a precursor to educational materials which will reflect continuing concern for improving the human condition. It is hoped that teachers will use the material herein, suggest improvements, construct their own materials, and in general, remain concerned and optimistic. We would be encouraged if your reaction to the materials included sending us directly your critique and any original concept, understanding, and activity material you feel prompted to construct.

BARRY W. JAMASON, Chairman
Environmental Curriculum Committee

TED T. GRENDA, Chairman
Environmental Task Force

Contents

Theme	ii
Foreword	iii
Rationale	iv
Introduction	v
Survival	1
Interdependence	7
Scarcity	13
Recyclement	19
Right vs. Responsibility	25
Planning	31
Valuing	39
Social Forces	47
Optimism	53
Appendix A	57
Appendix B	59
Appendix C	61
Acknowledgments	62

Survival

continuing life (or existence) in the presence of difficult conditions... survival depends upon the ability of an organism to adjust to its environment

Survival of an organism depends upon its ability to adjust to its environment.

Activity 1

The basic needs of men and animals seem to be approximately the same. These needs include a suitable living area, freedom from stress, territory, and a stable reproductive process. Have students consider the plight of a caged animal. Few animals readily adapt to this condition. Some reference study or a visit to a zoo will reinforce this understanding.

Discuss a "caged" man. Such things as job pressures, tenement housing, crowded freeways, busy shopping centers, and overused recreation areas may serve to trap a human being.

- What other factors can you think of which tend to "cage" man?
- What influences an animal in its search for shelter?
- Do human beings consider the same things when seeking a place to live?
- Is the environment compatible with the needs of man? Explain.
- What adjustments or avenues of escape can man exercise to insure his well-being and survival?
- How do rural, suburban, and urban environments each suit or thwart the needs of men?

Activity 2

Enclose a small plant in a cardboard box. Cut an opening in one end of the box, permitting sunlight or lamplight to enter. After a few days, students should observe the plant. (Due to auxins in the plant, phototropism occurred, causing the stem to bend toward the source of light. This effect will be more apparent with fast-growing plants such as bean and corn.)

- Why did the plant grow toward the light?
- What would have happened if the plant had been unable to grow toward the light?
- What other examples of plant or animal adaptability can you give?
- In what ways does man adapt to his environment?
- How has man changed his environment instead of adapting to it?
- What further changes might be necessary in the near future?

Man changes the natural environment to the extent that many species find it difficult to adapt to the new conditions.

Activity 3

Because many homeowners, particularly in the suburbs, tend to keep their property neat and tidy, they unwittingly destroy the natural habitats of birds and small animals. Clearing brush, removing fallen trees, and keeping grass cut short may all contribute to an attractive residence, but these practices make it increasingly difficult for animals to survive.

In cooperation with a woodworking or shop class, or an interested community group, have the class provide nest boxes or other havens for birds and mammals to use on a portion of the school property.

- What will be the effects of increasing housing and commercial construction projects on plant and animal communities?
- How will this influence our lives?
- How can the benefits of the above activity be repeated on a much larger scale in order to perpetuate plant and animal life?
- What sacrifices will man be forced to make?

Diversity is a key factor in the survival of an ecosystem.

Activity 4

Arrange a field trip to a natural community. Students should then report on the organisms which inhabit this community, describing the special problems associated with living there, and the adaptations necessarily made to overcome these problems.

- What different kinds of organisms were found in the community?
- How were they especially suited for life there?
- What is the advantage of the diverse nature of the community?
- How can the information learned there be applied to conditions in a human community?
- Should we diversify predominantly human communities? If so, why?
- What implications has the fact of rapidly increasing and merging human communities for diversity and survival?

Man's survival is threatened and challenged by his own rapidly increasing population.

Activity 5

This increasing population causes demands for greater industrial and agricultural productivity which in turn have produced increasing environmental contamination. As an example, many animals are suffering from the accumulation of DDT in their bodies. If the present incidence of pesticides use is continued, many organisms are in danger of becoming extinct, thus disrupting the food webs of which man is an integral part.

- Discuss how pesticides affect organisms other than those to which they are directly applied.
- Since DDT interferes with the calcium metabolism of various organisms, which phase of an organism's development is most seriously affected?
- What chemical properties enable 50% of the DDT used to remain in the soil for 10 to 15 years after its application?
- How do we reconcile the problem of destroying the chain of food supply by the methods used to increase the available amount of food?
- What will be the solution for nations which do not have the capacity to produce enough food for their populations without the extensive use of harmful chemicals?

Activity 6

Increasing world population is considered by many to be the greatest crisis of our time. We must face the reality of this situation and of the fact that all organisms have the biological capacity to overreproduce. It may be that man is manifesting this capacity.

Have students count the number of seeds in a pea pod. Assuming that each one will be planted and will germinate, how many plants will there be next year? Even if each one planted produced only one pod, how many seeds would there be for replanting the following year? Continue the exercise to the limit of mathematical practicality.

- Does this actually happen in nature? Explain.
- Try to relate this type of mathematical progression to human population.
- Using appropriate references, discover what population curves predict for the future.
- What new concerns has the environmental crisis revealed in regard to population and food supply?

- What was Malthus' observation about population and food supply? Was it correct? In terms of existing environmental conditions, does it have renewed significance today?

- Are the "four horsemen of the Apocalypse" significant factors in population considerations today? Explain.

Thinking about the future is a prerequisite for survival.

Activity 7

Discuss the major causes of air and water pollution. Emphasize the highly industrialized nature of society as the root cause of pollution. Have students develop fact sheets on types of pollution, their specific causes, and their deleterious effects on life in general. A composite fact sheet, incorporating the best elements of all student work, should be prepared by a committee for distribution throughout the school.

- Has this activity influenced your schoolmates to think about our environmental problems?

- How effective was the exercise?

- What would you propose as additional or more effective ways to stir concern among your peers and others?

Activity 8

Organize the class into two committees, each having the task of drawing up a "Charter for the Continued Existence of Man." After each committee has completed its version, convene the entire class and have each committee present its charter. Let the students discuss similarities and differences in their thinking and make a single charter from the two committee reports.

- What are desirable goals which would lead to man's continued existence?

- What problems does man face in the future?

- What practices will be necessary and desirable for solving these problems and attaining these goals?

- What will be the responsibilities of individuals in contributing to man's continued existence?

Interdependence

mutual reliance...
an organism cannot live alone

Living things are interdependent with one another and with their environment.

Activity 1

Organize a field trip to a local pond, stream, or other natural community. Divide the class into teams of 4. Assign each team a specific area (about 3 feet square) to study. Have 2 members of each group list all the types of plants and animals they find in their area. Have the other 2 members of the team observe the animal segment of the community and try to determine their sources of food. The activities of the animals should be recorded.

- Is the animal population confined to the area you are observing, or does it move in and out of the area?
- What do the animals eat?
- What organism is the producer in the area under study?
- Are there predators in this area? What are they?
- What are some of the producers and predators you might have missed in your survey?
- How do these organisms depend upon each other for survival?
- How is man dependent upon these organisms?
- How does man destroy these organisms (sometimes unknowingly)?

Activity 2

Collect some water from a pond area in bottles. Bring these back to the laboratory. Using sterile culture plates with sterile nutrient agar, place a few drops of the pond water on each of 4 or 5 plates. Incubate the plates for 24 hours at 37°C. (Carry out the same procedure with soil samples.) Observe the samples under microscopes. Discuss the observations made.

- How do these organisms contribute to the survival of plants and animals?
- How are these organisms related to the food chain or web in the pond community and in the land community?
- How are these organisms related to man's survival?

Activity 3

The class should prepare a list of 20 consumer goods (food and nonfood) commonly used. For each of these items, name the basic raw material or ingredient in its simplest form which is necessary for its preparation.

- Which, if any, of these basic materials are in short supply?
- How important are each of these items to our own well-being?
- What raw materials could be substituted for any of these listed if scarcity were a consideration?
- If there were no substitutes for some raw materials, what other products could take their place?
- What is man doing to prevent the diminution of these essential materials?

Activity 4

Collect complete specimens of alfalfa, birdsfoot, trefoil, or some other legume. Rinse the roots to expose the nodules which contain bacteria. (The bacteria increase the nitrates available to the plant.) Show a diagram of the nitrogen cycle on an overhead projector. Discuss this information with the class. Invite a local nursery man to speak to the class about certain plants such as rhododendron which are almost always sold with a root ball and soil to protect the bacteria on the roots.

- Would the plants be affected if no bacteria lived on their roots? How?
- Would the plant survive? Why, or why not?
- Is the plant necessary to the bacteria? Explain.

The energy requirements of man are met primarily by "food" and men are dependent upon other organisms through food chains and food webs.

Activity 5

Instruct the students to learn about food webs, and to construct a fairly complex one. Using these assignments, a class committee should prepare a transparency of a food web to be used with the entire class.

- Why are soil and sunlight necessary for all life?
- What is the source of food used by animals? What is the source of man's food?
- Are any of these food sources threatened by pollution?
- In a natural environment, if all the members of a particular species were removed from the food web, what would be the effect? (This point can be emphasized by removing one species from the transparency diagram.)

- In a natural community, what would be the effect of removing all predators (insect-eating birds, foxes, etc.) from the food web?

- What effect would an increase of predators have on the food web?

- As part of a food web, how does man differ from all other organisms? (Make sure students realize that man attempts consciously to manipulate the components which make up the web, and that man alone has the ability to understand the complex interdependencies and therefore has the obligation and responsibility to preserve the balance of the whole web.)

Activity 6

Construct an energy pyramid. Show the movement of energy from one trophic level to another. Emphasize that the producers obtain their energy from the sun and all consumers obtain their energy from producers. Point out that, as energy is transferred from one trophic level to the next, much is lost to the atmosphere in the form of heat.

- List the food products associated with the different levels of the energy pyramid.

- Is most of our food obtained from the upper or the lower portion of the pyramid? Account for this.

- In order to make more efficient use of the energy available, what part of the food pyramid must be exploited?

- If the world population continues to increase alarmingly, what parts of the energy pyramid might become unavailable? Why?

Natural resources are unequally distributed with respect to land areas and political boundaries, and the use or misuse of them affects others.

Activity 7

Considering food or really, arable land, as a relatively fixed or constant natural resource, hypothesize that unrestricted population increase (variable) is a misuse of resources. Determine the daily caloric intake of people in several representative countries among both the "haves" and the "have-nots." Obtain an outline map of the world and place these statistics in their appropriate places.

- Why are calories essential to life?

- What is the recommended daily caloric intake for a human being? Upon what is this based?

- What is the fundamental source of the calories which man obtains from his food?
- How do you account for the differences in national average daily caloric intake as indicated on your map?
- Make some predictions about caloric intake in these countries in succeeding generations.
- What consequences do you foresee in those countries where population increase exceeds the increase in agricultural productivity?
- What alternatives do the leaders of these nations have available to them?
- How will a problem like this affect other, more fortunate nations of the world?

Scarcity

smallness of quantity in relation to needs...
as populations increase, competition
for resources necessitates the establishment
of priorities

An understanding of scarcity is necessary to our understanding of the environment.

Activity 1

Mark off an area 6' by 6' in the classroom, suggesting that this represents the environment. Have one student (students representing population) enter the space. At intervals of one minute, add students to the area in the manner of a geometric progression (representing population growth). No student should be in contact with any other inside the area. Continue until no more students can enter the area. (Note that, as population of this area increased, each student had less space for himself.)

- What percentage of the class was able to enter the area?
- How long did it take to fill one-half the area? To fill the entire area?
- Suggest some additional deprivations that individuals would suffer under actual conditions of population increase.
- Is there a limit to what the world population can safely become?

Activity 2

Secure menus from several different restaurants. Have the students study the menus with particular attention to the availability and price of seafoods. Some students should survey area supermarkets and fish markets to determine again the availability and price of seafoods, while others do research on the status of our salt water fishing industry.

- What evidence is there to the consumer that some types of seafood such as lobster are becoming scarce?
- What are the reasons for this depopulation of some salt water species of fish?
- Why would conservation practices (fish hatcheries) be useful if applied to the fishing industry?
- To what extent is this already being done?
- What efforts has government made to forestall this developing seafood scarcity?
- Why are greater efforts necessary?

Activity 3

Students should collect pictures and magazine articles which illustrate examples of scarcity and factors causing scarcity. Some suggested problems that might be highlighted are the following:

- beaches closed due to oil spills (recreation)
- fish mutations and depopulation in polluted waters (food supply)
- clam harvesting areas closed due to pollution (food supply)
- urban smog (health)

- What other necessities of life are becoming scarce as a result of environmental degradation?

- Would nature replenish and cleanse itself if we were able to halt all forms of pollution immediately? How long would it take?

- Since we cannot or will not halt these forces immediately, what does the immediate future hold for the environment?

Natural resources, in terms of quantity and quality, are important to all living things. As population increases, competition for use of these resources increases, resulting in a need for establishing priorities.

Activity 4

Obtain a water test kit. Collect water samples from the school drinking fountain, home, local ponds, and nearby streams. Test each sample for bacteria and pollution. The pollution tests are described in each water analysis kit. To test for bacterial content, place a few drops of the water sample on a sterile culture dish containing sterile nutrient agar and incubate for 24 hours at 37°C. Compare your results with those from a sample of bottled water which may be obtained at the local grocery. (If oil immersion lenses are available on microscopes in the school, an immediate bacteria count may be performed by a capable student.)

- Which sample was most polluted?

- What reasons can you give for this fact?

- Was the drinking water polluted?

- Where does the drinking water come from, and what could have caused it to be polluted?

- What types of diseases are water-borne?

- What is currently done to purify your supply of drinking water?

- How does increasing population in your area affect the water supply (beyond reducing the amount available per person)?

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Activity 5

Discuss with the class ways of improving the quality of water. Consider the following possibilities:

- recycling water to remove pollutants
- curbing industrial effluent
- reduction of losses by evaporation
- water harvesting (collection, storage, and transport)

Discuss the suitability of various methods which would renew our water supplies, including:

- distillation of sea water (solar stills, nuclear desalinization, freeze distillation)
- ion-exchange methods
- reverse osmosis

- Debate and contrast the desirability of the above and other methods of increasing pure water supply with the desirability of improving the quality of present water supplies.

Some parts of the natural environment are difficult to replace, or are in fact irreplaceable.

Activity 6

Have students develop tables of resource use based on the needs of our largest consumer commodity industries, contrasting existing available resources with projected future needs. Several representative industries such as automobile, petroleum, chemical, and newsprint should be included.

- Do we need all the commodities we presently demand? Explain.
- How must we reconsider "planned obsolescence" and other self-defeating characteristics of the industrial operation?
- Discuss the physical limits of resource utilization which may begin to affect industrial production?
- Why must we begin to establish priorities for resource use?

Recyclement

continuous feedback for reuse...
man would do well to observe nature's
example and reuse the results
of his technology

In nature, there is a continuous recycling of many elements.

Activity 1

Discuss the succession of plants in a natural community. Then, try to arrange a visit to a natural community nearby, preferably one which reflects climax conditions. Students should identify plants of this climax stage.

- What happens to dead plants and animals?
- What causes their decay?
- What would our landscape look like if decay-precipitating organisms did not exist?
- Try to envision what form of life could exist in the absence of this decomposition-regeneration process.
- List the things produced in a natural community which do not decay.
- List some of the things produced in the human community which do not decay.
- What does the human community do to dispose of these things?

Activity 2

Determine the mineral content of some common foods (apple, bread, celery, potato, pork chop). Select one of the minerals and make a diagram which will illustrate its cycle through the environment.

- Why is life dependent upon the cycling of materials?
- How does man interfere with this process?
- In what ways does man attempt to maintain or facilitate the cycling of materials?
- What else must man do in this regard to sustain his own existence?

Activity 3

Since the supply of matter is finite, the continuation of life depends upon a cyclic flow of materials between organisms and their environment.

Have students learn the details of a major biogeochemical cycle (carbon, nitrogen, oxygen, hydrogen). When they are familiar with the principal details and processes of the cycle, describe how an atom circulates from the environment, through organisms and back to the environment.

- Why is life dependent upon the circulation of materials from one form to another through the environment?
- What predictions would you make if the flow of material in one of these cycles were slowed down? Suppose the cycle were stopped completely?
- What is the effect of an expanding human population on these cycles?
- How may these cycles affect the expanding human population?
- What can be done to improve recycling in order to meet the problems of an expanding population?
- What does this information suggest about the kinds of things we currently produce?

Activity 4

Take 2 stoppered test tubes, each one-half full of a Brom thymol blue solution. Bubble your breath through a straw into each tube until the Brom thymol blue turns yellow. Leave one tube stoppered as a control,and place a green water plant in the second tube. Stopper the tube,and place both tubes in the sunlight.

- After about 5 to 10 minutes - is anything happening?
- Where are the bubbles coming from?
- Of what are these bubbles made?
- After about 30 to 40 minutes - what is happening to the Brom thymol blue?
- What is this process called?
- Does this process occur in nature?
- What would happen if most green plants were to be eliminated from the earth? Describe the resulting environment.

Activity 5

Collect 3 boxes of local soil. Mix the first box with manmade fertilizers; the second with organic material; and use the third as a control box. Plant the same type of vegetation in each box. Keep a record of the growth. After the "crop" has been harvested, mix each box of soil with the same quantities of each fertilizer as was done for the first planting. Note results. If time permits, follow the same procedure for a third and fourth planting. Compare the results.

- Why are animal droppings no longer considered fertilizers, but pollutants?

- Why do farms rely so heavily on commercial fertilizers?
- Why do commercial fertilizers take away properties which permit the soil to use natural fertilizers?
- How does the use of commercial fertilizers disrupt the recyclement process?
- What are some ways in which you could use natural materials for fertilizing a home garden?

Man would do well to observe nature's example and recycle the results of his technology.

Activity 6

Lead a discussion of the meaning of recyclement. Ask students to bring to class articles, pictures, or models of things in our environment which can be and have been recycled. Some examples are:

- junked cars → scrap steel
- used newspapers → clean newsprint
- bottles → returned for reuse
- cans → reprocessed tin and aluminum
- trash → glass tubing, building tiles

- Why do both rich and poor societies need to recycle the results of their technology?
- What is "planned obsolescence?"
- How can we encourage and take advantage of our "trade-in" practices (e.g., used cars for new ones, etc.) with retailers as a means of promoting one form of recyclement?

Activity 7

Display in the classroom examples of our modern, throw-away containers; a soft drink can, a soda bottle, and a cardboard milk container. Have the students discuss what happens to these articles after they are discarded. Emphasize for the class that nature has its own recyclement process in that materials, in one form or another, are used over and over again. Man uses many things only once and then discards them, often in a nondegradable form.

- Why do our products seldom come in reusable containers any more?
- Of what materials are reusable containers and discards made?
- Do these materials readily return to their sources?

- How are we hindering nature's process of recyclement?
- How can man reduce the amount of waste he produces?
- What can individuals do to limit waste?

Activity 8

Students would probably become interested in solid waste disposal problems if they began a careful study of their own area (neighborhood, village, city, county). Have them make a large wall map or individual desk maps of the auto graveyards, public and private dumps, and other areas in the community used for depositing waste. In addition, they might include areas that are often afflicted with illegal dumping. Note the age or length of time these dumps have been in use and try to determine the degree of management or mismanagement of the operation. Discuss with local officials their current and future plans for solid waste disposal, if they have any. Investigate local, state, and national legislation involving dumps and solid waste disposal. Construct a questionnaire which could help determine public feeling about the problem.

Tape some interviews with private sanitation and public sanitation workers. Compare the problems of solid waste disposal in large metropolitan areas with those of the more thinly populated regions of the State.

- Are more laws needed? Why, or why not?
- Will technology provide the answer to the problem? Explain.
- What are some of the ways in which living habits and patterns might have to be altered if we are going to successfully cope with this problem?

Right vs. Responsibility

satisfying the requirements of suitability
or convenience vs. accountability...
man has exercised his right with little regard
for his responsibility to the environment

Man has exercised a presumed right to exploit the environment with little regard for his responsibility to preserve it.

Activity 1

A student committee should direct the preparation of a class ledger or scrapbook, or an imaginative bulletin board display which documents the types of pollution control problems, the individuals or organizations responsible, and projects designed to correct the situation.

This student activity should prompt class discussion of, and, hopefully, schoolwide attention to, the environmental crisis and society's responsibility. After publicizing some of the issues, students should be able to get provocative responses to the questions listed below. (The questions might be used in a survey of school and/or community opinion if significant interest and knowledge of the issues obtains in those places.)

- To whom does the environment belong?
- Who should be responsible for the control of pollution? How should this responsibility be expressed?
- In the case of industrially-caused pollution, should the polluter or the customer of the polluter pay the clean-up bill? Why?
- If a community establishes ordinances to control pollution, what is necessary to insure the success of these laws?
- Make a list of suggested ordinances that a city might establish to aid the pollution problem.

Activity 2

Discuss with the students some of the specific environmental problems resulting from "strip-mining." For example, the Department of Interior estimates that in excess of 3 million acres of land have been desolated by this type of mining operation, and desolation continues at the rate of about 200,000 acres a year. Farmers' acreage is destroyed by the "overburden" of strip-mining. Mining company representatives maintain a legal right to the ore deposits and claim to have no responsibility for destruction of farm land which results. They further state that providing coal for the general public is more important than preserving the land of individual owners.

- What is the reason for the use of the strip-mining technique as opposed to a less destructive method?
- Do the end results or benefits from the mining process justify the harmful side effects? Explain.
- What do you think of the mining industry's "legal rights" as paraphrased above?

- What might be some practical solutions to this apparent dilemma?

Conflicts emerge between private land use rights and the maintenance of environmental quality for the general public.

Activity 3

Students should prepare a class report on the ecology of an estuary which will illustrate what is being sacrificed in terms of plant and animal life in return for residential and industrial building sites. Encourage them to illustrate the principal points.

- What is an estuary?
- Why is an estuary so important to the development of many organisms?
- What can be done to prevent or limit building in these areas?
- What are the rights of individuals or corporations to whom these areas belong?
- Do they have the responsibility to consider the effects of their ventures on the environment? How should they express this responsibility?
- How do we choose which wetlands to preserve and which to develop in response to the needs of an expanding population? List specific criteria that should be used in making a determination.

Activity 4

Hypothesize for the class that a utilities company has decided to locate an atomic energy plant in the community. The community has a beautiful lake which the company must involve in the energy process.

Have students debate the proposal, insuring that many have the opportunity to assume the role of both the company representative and the people's plaintiff. The debate should encompass both preliminary and final negotiations and decisionmaking.

- What are the arguments for and against the location of an atomic energy plant in the community?
- If man is going to keep pace with the increasing demands for power, what can he do to facilitate the location of such important facilities as the one in this activity?

- How can decisions on such vital issues be made in the face of increasing resistance to destruction of any more of the environment?
- What alternatives are available to the utilities company, the local community, and to the individual?
- What alternatives will be available to society in general?

It is the responsibility of each individual to become aware of existing governmental regulations intended to protect the environment.

Activity 5

With your class, plan a school or grade-level assembly at which a concerned public official would appear to discuss existing and needed anti-pollution measures. Prior to the assembly, distribute ditto materials to the student body which explain some of the aspects of environmental abuse. A public official such as a town engineer, New York State Health Department representative, or a staff member from the Environmental Conservation Department would be able to discuss with the students a wide range of environmental concerns. You might choose a topic which is of particular local or regional concern: water supply; air pollution; waste disposal; and the rise in use of chemical fertilizers and insecticides.

- Why must we as members of the community know what can be done about pollution?
- As a student, what is your responsibility to the environment?
- What can your family do to help environmental conservation?

Activity 6

Instruct students to compose an Environmental Bill of Responsibilities. The amendments included in this document should outline personal, corporate, and governmental responsibilities for preservation of the environment. Publicizing of the finished document could be an effective reminder to the community and local government of their respective obligations, and such a project will have discharged some of the responsibility that must be borne by the school community.

- What are the differences in private and public responsibility?
- How can they be resolved?

Planning

detailing a program of action...
decisions concerning the future must be
based on long-term environmental benefits

Decisions concerning the future must be based on long-term environmental benefits.

Activity 1

Students should assume the roles of local government officials and dramatize a session of the Town Board or City Council as it considers approval of a proposed housing development. Other class members would appear before the Board as witnesses on aspects of zoning, conservation, recreational facilities, and town services. Some of the students should try to attend an actual Town Board or City Council meeting in advance of the class activity so that they might serve as advisors to the class dramatization.

- What special interest groups would you expect might try to influence the proceedings? In what ways?
- What rights do these groups have?
- How does intelligent planning include considerations of streams, lakes, forests, open spaces, drainage, sewer systems, and esthetic beauty?
- Do we know of any housing developments that have risen in value due to environmental planning some 20 years ago? Describe.
- What environmental factors would you like to see considered before populations are housed. Why?

Activity 2

A class committee should be formed to investigate the topic, "Nitrates." The information collected for a report to the class would include definition (nitrogen compounds); their principal use (commercial fertilizers and explosives); their source; and the action of the Federal government with respect to nitrate manufacture during World War II (used exclusively for munitions production).

- Why do nitrates present a problem for man? (The natural nitrogen cycle is too slow in relation to human demands.)
- Why did the Federal government take the action it did regarding nitrates during World War II?
- How did this action affect agricultural production?
- How can farmers compensate for the lack of commercial nitrate fertilizers?
- What would be the long-term effects of continued government restrictions on nitrate usage in agriculture?

Activity 3

Without giving any indication that this exercise will deal with the environment, ask half of the class to work collectively on a design for the automobile of the year 2000. This design should reflect consideration of all the changes society might undergo during the next 30 years. The remainder of the class would design an automobile which specifically considers the disadvantageous aspects of current automotive production in terms of our concern for the environment. Assuming that the differing objectives for both groups have not been compromised during the project, compare the foresight evidenced by the first group with the directed effort of the second.

- Has the general concern about the automobile's contribution to the environmental crisis been effectively transmitted to the first group of students? Explain.
- Why have automobile manufacturers not responded more quickly with alternatives to the internal combustion engine?
- What will be necessary to cause man to relinquish his taste for high speed autos and frequent design changes?
- Discuss the comparative advantages of the suggested, but not yet produced alternatives to present autos.
- In lieu of immediate production of such alternative vehicles, should the use of the internal combustion engine be drastically restricted?
- If yes, how could this be done and by whom?

Activity 4

Ask a group of interested students to propose a design for a new city. Have the entire class contribute ideas regarding the most important factors to be considered in building a new city. Include such factors as water supply, available transportation, and economic opportunities. Some members of the group will be interested in making scale drawings showing the layout of the total community.

Encourage innovation in this city design. An example might be to include a proposal for "auto free zones" in parts of the community. Actual surveys or interviews by students in the community would lend considerable breadth and weight to the resulting design.

- What are some of the most difficult problems to solve in today's cities?
- Why is a good water supply so important?
- How can the natural beauty of a city be preserved?
- What agencies other than the schools should be included to contribute to a good community education program?

- Why is it so important to control vandalism in the cities?
- What helpful information could be obtained from a person who works in a city planning organization?

Man alters the options available to future generations when he unwisely manipulates the natural environment.

Activity 5

Hunting regulations are useful in maintaining and restoring populations as well as in distributing the game harvest. Students should research and record the laws in their community, county, and State that pertain to the killing or capturing of wild animals.

Discuss present day motives for hunting vs. its original purpose.

- Do any of the laws contradict each other? Give examples.
- Are the laws properly enforced? By whom?
- What punishment is meted out to law breakers? Is it severe enough to discourage violations?
- What is the money collected for licenses used for?
- How much money is collected in your area each year?
- Is this money being used for what it is intended?
- Should additional restrictions be placed on the hunting public?
- What natural predators are in your area? Now? In the past?
- Do these natural predators play an effective role today in the control of game?
- Do our present hunting regulations help preserve or maintain balance in the natural community or do they need reexamination with this objective in mind.

Activity 6

Present the following item to the class for thought and discussion on the subject of man's manipulation of the natural environment:

An example of the result of upsetting a natural predator-prey relationship is the Kaibab Plateau near the Grand Canyon. Here, in 1907, there were 4000 deer and a substantial population of their predators, mountain lions and wolves. When an effort was made to protect the deer by eliminating the predators, the deer population increased tremendously. By 1925, there were 100,000

deer on the plateau, far too many for the supply of vegetation. The deer, in their search for food, damaged the vegetation markedly. During the next three winters large numbers of deer starved to death, and in time their numbers declined to about 10,000.

- What was man trying to accomplish?
- Why did his actions seem the most logical ones to take?
- Could you prescribe what should have been done on the Kaibab?
- What is the present situation on the Kaibab Plateau?

Environmental quality must be maintained as population increases and the available space per individual decreases.

Activity 7

Examine and map the private and public ownership patterns of the shoreline of a coastal area or lake resort area. Use a key to indicate private and public ownership. Further examine the rights and restrictions pertaining to individual use of lake or shore areas which are privately owned and those which are publicly owned. Analyze the reasons for the current skyrocketing prices of shoreline and lakeside properties. Inquire of a State official the direction the State intends to take relative to making more lake and shore property accessible to the public for recreational purposes.

- How was it possible for large tracts of lake and shore property to become the private domain of a few to the exclusion of the many?
- What are alternative settlement patterns which would allow for the possession of private property near lakes and shores but, at the same time, permit maximum use of the immediate shoreline and lakeside areas by the public? (Attention might be called to shoreline planning in certain sections of the Gulf Coast.)
- As population increases and pressure increases on recreational facilities, what conclusions can be drawn concerning the non-availability of lakeside and shoreline properties?

Man's efforts at changing the environment to fulfill his needs are often beneficial to him but harmful to the environment.

Activity 8

Divide the class into groups. Using a basic outline map of the community, have one group show the area as it exists today;

have a second group show the area as it was 25 years ago; a third group should depict it as it was 50 years ago; and a fourth group, as it was 100 years ago. This information can usually be obtained from town records. To discover what your local area was like in the eyes of its residents, have one group interview residents of the town who have lived there for 25 years. Have another group interview a 40-to 50-year resident of the community. When all data has been collected and summarized, list the changes which have occurred.

- Were these changes helpful or harmful? Explain.
- Looking back, what could have been done to prevent the harmful changes?
- Looking ahead, based on what we now know, what changes do you foresee?
- Will these be helpful or harmful? Explain.
- What can we do to prevent the harmful ones?
- How could this process you have employed be modified for use on a national scale?

Valuing

assessing relative worth or importance...
man is endangering his chances
for a better life through the very measures
he employs to achieve it

Man currently faces the prospect of endangering his chances of a better life through the very measures he employs to achieve it.

Activity 1

Students should develop a survey questionnaire to be used with schoolmates, parents, and community residents on the value of automobiles and public transportation. In the case of the auto, the survey should determine which values beyond the merely functional are serious considerations of consumers. For public transportation, determine whether there would be a willingness to substitute it for private transportation to any significant degree.

- How important is social and economic status in the question of automobile ownership?
- Why will it be difficult to persuade Americans to seek alternatives to the automobile, currently recognized as a major pollutant?
- How can automobile companies be persuaded to seek ways of developing markets for automobiles which will reduce the quantity of pollution?
- How can consumer values be changed to increase insistence upon a reduced number of pollutants from the automobile, or insistence upon better forms of transportation?

Activity 2

Suggest to students that over a period ranging from 24 hours to several days they must plan their own personal living patterns in such a way that each will in no way contribute to further degradation of the environment. The student must function "normally," yet must live within the particular framework he establishes for himself over this given period of time without damaging the environment. Imaginative students should be able to find ways to meet most of their needs.

Perhaps this activity should be one of graduated difficulty, moving from the least difficult to the most difficult. For example, begin by pledging that no student participating will in any way use a vehicle powered by an internal combustion engine, or use food which comes in nondegradable containers or wrappers. A more difficult project might be to function for a day without using any electrical energy. In order not to make this activity into an experience likely to be ridiculed, care should be taken that students try to develop practical alternatives to what they are giving up or not doing.

A film on new developments in transportation which are less harmful to the environment might be good to show in conjunction with this activity.

- What one thing you "gave up" did you miss the most? Why?
- Did you find your pattern of life hampered by inconveniences during this period? In what way?
- Would you be willing to learn to live differently in an effort to preserve our environment? Why, or why not?

Activity 3

Ask the students to make a shopping trip and note the kinds of containers used for soft drinks. Also, have them count the number of different types of soft drinks. (This could be committee work.) In the classroom, make two charts and list all the soft drink brands available in returnable containers and all those available only in disposable containers. Have some students interview store managers about why so few returnable bottles are stocked.

- Why have disposable bottles become so popular?
- How are they presently disposed of? Is this wasteful?
- What problems does this create?
- Would it be possible for us to have only reusable containers for beverages? Would it be very inconvenient?
- Why is it worth some inconvenience to eliminate this problem?

Individuals (and because of them, industry) tend to select short-term economic gains, often at the expense of greater long-term environmental benefits.

Activity 4

The future of the Adirondack Mountains will have an effect on the entire State. What we cause to happen to that area will be determined by the citizens of the State.

Have members of the class obtain data about the Adirondack Mountains area of New York State from the New York State Department of Environmental Conservation, the Adirondack Mountain Commission, and the New York State Department of Commerce. Use geologic maps and road maps to locate and describe the area. Canvass school children to collect slides and pictures of the area. Obtain information about the economy of the Adirondack region.

- What is the value of "forever wild" areas?
- Should motorbikes, autos, and snowmobiles be prohibited in certain parts of the State? Why, or why not?

- Is commercial development of the Adirondack Mountain region, or parts of it, desirable? Explain.

Activity 5

Have a group of students list the major materials used for building in their locality and have them identify examples of structures constructed from each of the materials. Also, have them give the approximate dates the buildings were constructed and identify the sources of the building materials.

Ask a second group of students to collect samples of the raw materials used in these constructions. Test for the difference in durability of the materials by exposure to heat, the effect of water action, and the results of friction. Other information about the materials can be obtained from library references, a local Public Works official, and through interviews with local building contractors.

- What building materials were imported? Why?
- What are the most commonly used building materials in your area?
- How does climate affect the use of building materials?
- Why are some materials much more durable than others?
- What are some ways in which man can increase the durability of natural building materials?
- What are some ways in which he can improve upon the natural beauty of these materials?
- List the strengths and weaknesses of the 5 most commonly found building materials in your community.
- What are some ways in which man can conserve the source of natural building materials?
- What do we sacrifice in our efforts to provide mass construction at low cost?
- Do we have any choice other than to proceed as we do now in our construction industry?

Individuals must learn to make decisions which reflect or represent collective interests.

Activity 6

Present students with the following situation based upon an actual occurrence.

The residents of a badly eroded hill-country area, where most of the forest had been completely lumbered 25 years previously, found that they had to drill their wells deeper in order to maintain their water supplies. They also discovered that during periods of drought their crops were more likely to fail than had been the case prior to the lumbering operations. An organization of sportsmen in a nearby city formed a corporation to buy land and build a dam on a small spring-fed stream in order to provide fishing and other recreational facilities. The local property owners disapproved the proposed project on the basis that it would tend to spoil farm land and would have the undesirable effect of bringing large numbers of sportsmen and vacationers into the area.

- Why had the land owners not objected to the lumbering operations 25 years ago?
- Does construction of the dam present a more serious threat to their land than the lumbering operations did long ago? Explain.
- What is the relationship between the lumbering of the forests and the erosion now being experienced?
- What is the relationship between the lumbering and the current necessity for deepening the wells? Between the lumbering and the increased failure of crops during dry weather?
- Are the objections of the land owners to construction of the dam valid?
- What might be the arguments for and against construction of the dam?
- What alternatives did the land owners have 25 years ago?
- What alternatives do they have now?
- How might these people arrive at a sound decision with respect to their problems?

Art can be an expression of an individual's feelings about his natural surroundings.

Activity 7

Collect cans, papers, bottles, and other common, packaging waste materials from a specific area such as a road near school, the school parking lot, or the village playground. The class should make representative samples of this waste into a large, "attractive" collage. When finished, it should be displayed prominently in the school with the source of the materials

identified. Devise a means of bringing school attention to the purpose of the display, possibly with an information and question sheet which would invite response to the collage and what it represents.

- What can manufacturers do to eliminate or cut back the amount of refuse and litter?
- Why do people litter?
- As a class (and a school), what can we do to prevent people from discarding material in this particular area and throughout the environment?
- Do you seriously think that people want this kind of an environment as opposed to one free of clutter and waste? Why or why not
- What are we presently choosing over a healthy, beautiful environment? Why?

Activity 8

Conduct a class exercise in which each student develops an artistic representation of his feeling for his natural surroundings These feelings may be expressed as a painting, a poem, a model, or as a work of prose.

- How does this creation represent your feelings?
- How will man fare in a world increasingly technological and materialistic?
- Will art forms become an escape from this world or a means of improving it? Why?

Social Forces

agents of change in society...
society must be moved to insure the
preservation of the environment

In order to preserve our threatened environment, present attitudes must change to reflect a widespread public concern which will encourage protective action by individuals, groups, and government.

Activity 1

Encourage students to keep a careful record or log of TV or radio commercials for a week. Have them pay particular attention to ads for products which might contribute to pollution problems. They should try to determine if the advertising in any way reflects a growing concern on the part of the businesses for prevention of further environmental degradation. Also notable would be any commercials which seem to be directed toward helping the public better understand some of the problems and hazards involved in using many products such as detergents and pesticides. A positive culmination of the exercise would be to have students write letters of support and praise for those companies which do seem to be concerned and which are actively working to halt pollution.

- How is commercial advertising responding to the environmental crisis?
- Do radio and TV commercials have a great potential for influencing public thought and behavior? Explain.
- How do citizens exercise some control over the kind of advertising used on TV and radio?

Activity 2

Conservation has been defined as, "a way of happily relating man to his natural resources." A definition of pollution is that it is, "too much of anything." William Howard Taft once described conservation as, "the greatest use of resources for the longest period of time to benefit the most people."

Using these suggestions as guides, have the class collect other materials for an Environmental Glossary of terms, phrases, definitions, and quotations. In developing this verbal awareness of environmental concerns, attention should be given to a critical analysis of each for relevance, impact, and suggestiveness. The results of this exercise, the glossary, might be refined and disseminated throughout the school and the community.

- Did former President Taft use a definition that might have been workable in 1910, but is of limited value or meaning today? Explain.
- Are the quotations meaningful or merely clever and simplistic? Why?
- Which of your items can you agree upon as being representative of an appropriate attitude toward the environment?

- Is the glossary an effective way of publicizing a concern for the environment? Why or why not?

- What additional uses can you make of the Environmental Glossary?

Activity 3

Each student should be encouraged to express his ideas about the environment as a cartoon. Samples of professionally drawn cartoons can be found in the daily newspaper. The most effective of these student efforts may be prepared as transparencies for overhead projection. Some of the best cartoons might be submitted to the school, or even the local, newspaper.

- Why are cartoons a very effective communication device?

- How could the widespread use of this form of art contribute greatly to the battle to save the environment?

- Regardless of how "good" your cartoon was, how have you contributed by drawing one?

Activity 4

Arrange for local law enforcement officials to discuss with your class the nature of the laws and ordinances which must be enforced in the local community and throughout the State. The District Attorney might be interviewed or invited to discuss with the students the kinds of cases that can be initiated by the people of a community. An effort should be made, through the Attorney General's office or the New York State Health Department, to discover the kinds of problems against which the State is taking action.

- Is there a lag between the initiation and the enforcement of laws which are designed to save the environment?

- What, if any, are the penalties for destroying the environment?

- What kinds of cases are currently being prosecuted by the counties, cities, and the State? Give some examples.

- What loopholes make prosecution difficult?

Activity 5

The class should study the structure of the local agency of government (village, town, city, or county). Once a chart of the tasks performed by government officials is made, the students should determine the presence or absence of a responsibility for environmental planning.

- Who in the local government is responsible for environmental planning?

- Is this his only task, and if not, how many other tasks is he responsible for?

- Should the local government have a director of environmental planning? Why?
- Considering your own community, what kinds of jobs could an environmental planning department include?
- What kinds of past errors might have been avoided had there always been a department of environmental planning?

The exercise may easily be extended to include State and Federal government functions:

- What kinds of environmental legislation are being recommended on the State and national levels of government.
- What groups are seen as consistently supporting legislation to check the deterioration of the environment? What groups are seen as constantly opposing further controls over private development?
- What is the effectiveness of the legislative approach to solving our environmental problems?

Activity 6

Obtain the following film for use in your class:

Tom Lehrer Sings Pollution (3 min., B/W. Free. Public Health Service, Audio Visual Facility, Atlanta, Georgia 30333.)

Preview this film which vividly portrays the various forms of pollution in our environment. Jot down the lyrics for students and ask for a reaction to them. Show the film.

- What is Tom Lehrer's attitude toward the pollution problem?
- How does Tom Lehrer feel about the way the country is moving to correct the problem?
- To whom is he directing his music?
- Give students an opportunity to write their own lyrics about the pollution problem.
- Consider how Tom Lehrer might react to a community allowing a major producer of industrial waste to locate in that community.
- Is this a convincing way to present a problem or issue for discussion?
- What are the advantages and disadvantages of such a presentation?
- What should be our attitude toward the pollution problem?

Activity 7

During the 1930's the Federal government established the C.C.C. program primarily to solve an unemployment problem. The efforts of this organization were basically conservation-oriented.

Ask a group of students to prepare a brief report on a number of specific activities performed by the C.C.C., and have them show how each activity actively aided the conservation program.

Ask another group of students to create and name a new conservation-minded organization (Federal, State, and local), naming specific tasks and indicating how each would advance the cause of conservation.

- Why should the individual be concerned with helping the Federal, state, and local governments support programs of conservation?

- Give some examples of some small-scale conservation problems and indicate how each might be solved with the assistance of local government.

- Give some examples of large-scale conservation problems and indicate how each might be solved with the assistance of the Federal government.

- Over what types of conservation problems could the State government exert the greatest effective control? Explain how this might be done.

- Explain one way you might change the attitude of one of your friends who is wasteful of a natural resource. Outline the specific steps you would follow.

Optimism

anticipating the best possible outcome...
man has the capacity to make this the best
of all possible worlds

Man has the ability to make this the best of all possible worlds.

Activity 1

Conduct a brief discussion about what man has done to his environment through deliberate destruction, apathy, and ignorance, and what he proposes to do in the future to correct his mistakes. Then, with the discussion as a background, conduct an essay contest on the topic, *What the Future Holds for Mankind.*

Arrange for some kind of recognition of the winning essayist.

- What role does the written word play in the battle to protect man's environment?

The arts seem to aid man in feeling a oneness with nature and with fellowmen.

Activity 2

Assemble for class study a collection of man's efforts in several artistic media, using a central theme. For example, with "trees" the theme, present the following:

- Paintings: "Edge of the Woods"
  "Autumn Oak"
- Poems: "Trees"
  "Stopping by a Woods on a Snowy Evening"
- Songs: "Maple Leaf Forever"
  "Autumn Leaves"
- Essays: "The Big Trees"
  "Green Timber Trails"

Emphasize that man's appreciation of the environment reinforces his concern for it.

- Identify the authors of these efforts.
- Does examination of these creative efforts move you to a concern for the environment? Explain.
- What is the benefit of such creativity?
- Does this ability of man suggest that he is capable of protecting the environment he can depict so well? Explain.

Opportunities have been provided for man to experience and enjoy nature.

Activity 3

Have the students prepare a list of State and local recreation areas. They may write to the New York State Environmental Conservation Department, Division of Lands and Forests for printed literature. From this literature have them write brief summaries of the appealing aspects of these various parks. Ditto their comments and distribute them throughout the school. This activity will not only make them aware of the abundance of parks, but will also show how our State and local governments are working to preserve nature for their use. Try to arrange a class field trip to a nearby State or city park. If this can be done, the following questions might be used to stimulate discussion.

- What aspects of the area visited did you find the most appealing? Why?
- What were the noticeable efforts on the part of the government agency to preserve nature?
- What suggestions can you make that might contribute to the preservation of our natural environment?

Although much needs to be done to improve and preserve our environment, we must stop occasionally and acknowledge the gains that are being made in these directions.

Activity 4

Make a community survey of business firms both locally and nationally owned which shows what steps these firms have taken or plan to take toward the abatement of environmental pollution. Try to discover the reasons which motivated these companies to take corrective measures. Try to determine if any firms have left this area for one with more permissive attitudes toward environmental degradation.

- What motivated these companies to take a positive stance on the environmental issue?
- In what ways were you encouraged by the results of your survey? Discouraged?
- Is a survey an effective way (if done professionally) of keeping the public informed of progress toward improving our environment? Explain.

Appendix A

Environmental Education: Subject Headings

Adaptation (Biology)
Aeroplanes. Noise
Air. Pollution (or Air pollution)
Air Purification
Automobile exhaust gas
Birth control
Cities and towns. Growth
Cities and towns. Planning
City noise
Cleaning compounds
Community development
Conservation
Conservation education
Conservation of natural resources (or: .... of resources)
Detergent pollution of rivers, lakes, etc.
Disinfection and disinfectants
Dust
Ecology
Environment
Environmental .... For example: Environmental health, policy, education, etc.
Factory and trade waste
Forests and forestry
Human ecology
Hygiene. Public
Insecticides
Jet planes. Noise
Man. Influence of environment
Man. Influence on nature
Marine pollution
Marine resources
Natural resources (with subdivisions)
Nature conservation
Noise (with subdivision - example: Noise. Physiological effect.)
Noise control

Odor control
Oil pollution of rivers, harbors, etc.
Pesticides
Pesticides and the environment
Pollution
Population
Radioactive fallout
Radioactive pollution (or contamination) of water; the sea; the atmosphere
Radioactive waste disposal in rivers, lakes, etc.
Radioecology
Reclamation of land
Refuse and refuse disposal
Sanitary engineering
Sanitation
Sewage engineering
Slums
Smog
Smoke
Soil Conservation
Soil erosion
Soil exhaustion
Soil pollution
Spraying and dusting residues in agriculture
Thermal pollution of rivers, lakes, etc.
Traffic noise
Waste disposal in the ocean
Water. Pollution (or: Water pollution)
Water. Purification (or: Water purification)
Water conservation
Water quality
Water resources development
Water - supply
Wildlife. Conservation

Appendix B

General Indexes

Applied Science and Technology Index
Education Index
Educational Resources Information Center (ERIC) Research in Education
Essay and General Literature Index
Monthly Catalog of U.S. Government Publications
New York Times Index
Reader's Guide to Periodical Literature
Social Science and Humanities Index

Periodicals (Continuing Features on the Environment)

American City - "Air Pollution Control News"
Field and Stream - "Conservation" by M. Frome
National Parks Magazine - "News and Commentary"
National Wildlife - "Washington Report" by L. S. Clapper
Saturday Review - "Environment and the Quality of Life" by N. Cousins
Time - "Environment"

Periodicals (Highlighting Environmental Concerns)

America
American Biology Teacher
American City
Atmospheric Environment
Audubon
Conservationist

Environment
Journal of Environmental Science
Journal of School Health
Journal of the Air Pollution Control Association
Journal of the Water Pollution Control Federation
Newsweek
Saturday Review (Science Issue)
School Science and Mathematics
Science
Science Education
Science News
Science Teacher
Scientific American
Time
Today's Health
U.S. News and World Report

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Mead, Margaret
Rienow, Robert
Teale, Edwin Way
Whyte, William H.

Film Indexes

Educators Guide to Free Films. Wisconsin; Educators Progress Service, Inc.

Educators Guide to Free Filmstrips. Wisconsin; Educators Progress Service, Inc.

National Information Center for Educational Media. Index to 16 mm Educational Films. N.Y.; R. R. Bowker

National Information Center for Educational Media. Index to 35 mm Educational Filmstrips. N.Y.; R. R. Bowker

Appendix C

Individuals, groups, and government agencies that may serve as resources for information or as classroom speakers on the environmental issue:

Amateur naturalists in the community
Audubon Society
Chamber of Commerce
City manager
College biologist or ecologist
County Agricultural Extension Agent
County highway department
Farmer
4-H Club
Izaak Walton League
New York State Department of Commerce
New York State Department of Environmental Conservation
New York State Health Department
New York State Museum and Science Service
New York State Water Purification Board
Police department
Representatives of local industry
Sierra Club
State University of New York at Albany Atmospheric Science Research Center
SCOPE - Suffolk County
Town supervisor
Tree nursery operator
United States National Park Service
Water commissioner

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